



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/599,659

04/23/2008

Wittich Kaule

0055.0013US1 (P-00060)

2401

29127 7590 04/30/2010  
HOUSTON ELISEEVA  
4 MILITIA DRIVE, SUITE 4  
LEXINGTON, MA 02421

EXAMINER

SAHU, MEENAKSHI S

ART UNIT

PAPER NUMBER

2881

MAIL DATE

DELIVERY MODE

04/30/2010

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/599,659	<b>Applicant(s)</b> KAULE ET AL.	
	<b>Examiner</b> MEENAKSHI S. SAHU	<b>Art Unit</b> 2881	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 04 October 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-24 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 October 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>10/5/2006</u> .   | 6) <input type="checkbox"/> Other: _____                          |

**DETAILED ACTION**

***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1 to 24 are rejected under 35 U.S.C. 102(b) as being anticipated by Kley, E.B. and Schnabel, B. (hereafter referred to as Kley, "E-beam lithography: a suitable technology for fabrication of high accuracy 2D and 3D surface profiles", Proc. SPIE 10/23/1995, pages 71 to 80, vol. 2640, SPIE Bellingham, USA ; supplied by the Applicant with IDS of 10/05/2006).

Art Unit: 2881

**Claims 1 and 13:**

Kley discloses an electron beam device [the LION LVI electron beam writer - abstract] and method for producing an electron beam lithography system that produces an electron beam [Section 2], the beam axis of which lies largely perpendicular to the resist in which the resist profile is produced [Fig 1], wherein the electron beam is adjustable with regard to the electron surface dose [Section 4] such that a resist profiled element that exhibits a non-orthogonal resist profile is produced as a result of irradiation with the electron beam [Section 5].

**Claim 2:**

Kley discloses the resist is applied to a substrate [Fig 1].

**Claim 3:**

Kley discloses the resist layer comprises a negative resist [Section 4, page 72].

**Claims 4 and 15:**

Kley discloses the resist profiled element comprises a grating structure that consists of a parallel array of depressions and elevations [Figs 4 and 5].

**Claim 5:**

Art Unit: 2881

Kley discloses a primary energy of the electron beam is continuously adjustable with a lower limit of 1 KeV and an upper limit of 20 KeV [Section 4, Section 3 – see parameters for the LION LVI and Fig 2].

**Claim 6:**

Kley discloses resist thickness layers of 200nm and 350nm [Sections 4 and 5 and Figs 6 and 7].

**Claims 7, 12, 14, 20 and 24:**

Kley discloses the electron surface dose focused on the resist is dependent on the primary energy, electron scattering in the resist layer [= resist type], probe size and exposure time of the electron beam in the resist layer, resist thickness, development time [Sections 3 and 4 and Figs 2 and 9]. Kley also discloses the resist profiled element comprises a grating structure that consists of a parallel array of depressions and elevations [Figs 4 and 5].

**Claims 8 and 21:**

Kley discloses the primary energy of the electron beam in the resist layer defines a scattering cone having a diameter where the diameter of the scattering cone is inversely proportional to the electron energy [Fig 9 and Section 3, “proximity effect”].

**Claims 9, 16 to 18:**

Kley discloses controlling the slope of a surface and the edges using a suitable electron dose distribution or variable energy writing for producing multilevel and continuous surface profiles [Section 4 and Fig 2].

**Claims 10 and 23:**

Kley discloses the probe size is quasi-continuously adjustable [by fast deflection of the electron beam, the beam size can be altered i.e. “dynamic beam expansion” Section 3]

**Claim 11 and 22:**

Kley discloses electron probe sizes of <5nm at 1.0KeV and <2nm at 20 KeV [Section 3]. These sizes are typically smaller than the smallest possible structure size.

**Claim 19:**

Kley discloses the surfaces in the resist layer are exposed with a variable electron dose and the appropriate electron dose for the pertaining and residual resist thickness is determined after the development process [Section 4].

***Conclusion***

3. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Kley (US 5,620,814) and Kley (US 5,566,023).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MEENAKSHI S. SAHU whose telephone number is (571)270-3101. The examiner can normally be reached on Monday - Friday 8AM - 5PM est.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert H. Kim can be reached on 571-272-2293. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2881

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jack I. Berman/  
Primary Examiner, Art Unit 2881

/MEENAKSHI S SAHU /  
Examiner, Art Unit 2881